

Cardiovascular Disease and Diabetes:

Getting to the Heart of the Matter

Healthy People 2010 Objective 5-7

Reduce deaths from
cardiovascular disease in
persons with diabetes

Cardiovascular disease (CVD) is a leading cause of disability and the leading cause of death in the U.S. and in Utah. There are a number of risk factors for CVD, including age, obesity, sedentary lifestyle, and tobacco use, but one of the most notable risk factors is diabetes. People with diabetes have a two- to four-fold higher risk of developing cardiovascular disease than their counterparts without diabetes. In recognition of the above facts, Healthy People 2010 Objective 5-7 underscores the importance

of reducing the risk of CVD among people with diabetes.

Cardiovascular complications account for at least two-thirds of health care costs for people with type 2 diabetes.¹ Nonetheless, the risk of cardiovascular complications remains relatively underestimated among people with diabetes. In a recent national poll of 2,000 people with diabetes, conducted by the American Diabetes Association, two out of every three respondents reported being concerned about their increased risk for blindness and amputation, but most did not consider their risk of cardiovascular complications to be a significant problem.² A survey of people with diabetes conducted

in Utah found strikingly similar results. When asked to state what concerned them most about their diabetes, Utah respondents were much more likely to state blindness, amputation or kidney failure than they were to state heart disease, heart attack, or stroke.³

This brief report examines the degree to which Utahns with and without diabetes differ with regard to CVD risk factors, hospitalization, and mortality. CVD, for this report, is defined, unless otherwise noted, as any type of cardiovascular condition, including stroke, coronary heart disease, heart failure, and heart attacks (ICD-9 codes 390-448; ICD-10 codes I00-178, G45).

Prevalence of Cardiovascular Risk Factors among Utahns With and Without Diabetes: Bless Their Hearts

CVD and diabetes share many of the same risk factors, and in unraveling the linkage between diabetes and CVD complications, an important question is the degree to which persons with diabetes exhibit greater prevalence of CVD-related risk factors than their counterparts without diabetes. Such information would both help to explain any observed association as well as point to

possible reinforcement of CVD-risk of the diabetes condition itself. This latter finding would highlight the need for especially aggressive intervention and treatment.⁴

The contrasts in prevalence of five major risk factors for CVD (e.g., blood pressure, weight, physical activity, smoking and cholesterol) for Utah adults with and without diabetes are shown

in Table 1. Nationally, the prevalence of hypertension among people with diabetes is two to three times higher than that observed for people without diabetes, even after adjusting for age.⁵ This national pattern is also observed among Utah adults, where those with diabetes are nearly two and one-half times more likely to have high blood pressure than those without diabetes (50.8% vs. 21.3%).

Table 1.

Cardiovascular Disease Risk Factors of Utah Adults (18 and Over)
With and Without Diagnosed Diabetes
Utah 2001-2003

Risk Factor	Adults With Diabetes			Adults Without Diabetes		
	Percentage	95% CI Lower	95% CI Upper	Percentage	95% CI Lower	95% CI Upper
Told they Have High Blood Pressure ^a	50.8	41.8	59.8	21.3	20.1	22.5
Overweight or Obese ^b	71.3	64.3	78.2	54.9	53.7	56.1
Not Participating in Regular Physical Activity ^a	60.5	51.0	70.1	45.3	43.7	46.8
Current Smoker ^b	10.9	6.3	15.5	12.6	11.8	13.4
Told They Have High Cholesterol ^a	45.9	36.3	55.4	20.8	19.6	21.9

Note: Because the number of cases are small for some of the measures, data for a three-year period are combined.

Source: Behavioral Risk Factor Surveillance System, 2001-2003, Bureau of Health Promotion, Utah Department of Health

^a Asked in 2001 and 2003 only

^b Asked all three years

Being overweight or obese is often associated with diabetes. One recent study suggests that, in fact, overweight and obesity accounts for as much as 70 percent of type 2 diabetes in the U.S. Each kilogram (2.2 pounds) of weight gain over a ten-year period increased the risk of developing diabetes by 4.5%.⁶ Over 70 percent (71.3%) of Utah adults with diabetes are overweight or obese, compared to just over half (54.9%) of their counterparts without diabetes.

Physical inactivity is linked to increased risk of adverse cardiovascular events, and the risk is especially pronounced for people with diabetes. Participating in physical activity 30 minutes at least 5 days a week can significantly reduce this risk.⁷ For this report, to be considered participating in regular physical activity, a person must be participating either in moderate physical activity for 30 or more minutes/day on five or more days/week **or** participating in

vigorous physical activities for 20 or more minutes per day at least three days per week. Utah adults with diabetes are more likely than adults without diabetes to participate regularly in physical activity (60.5% versus 45.3 %).

Nationally, as many as one of five deaths from CVD is linked to tobacco use. The mortality risk from tobacco use is even greater among people with diabetes.⁸ Utah adults with diabetes are actually slightly less likely to smoke than their counterparts without diabetes (10.9% versus 12.6%). Moreover, fewer Utah adults with diabetes smoke than have hypertension, high cholesterol, or are overweight or obese.

Lipid management is an important component of comprehensive diabetes care.⁹ The American Diabetes Association recommends if that people with diabetes have a total cholesterol level of 135 mg/dL or higher, some

intervention (e.g., statin therapy) may be necessary, especially in individuals age 40 or over. Data from the Heart Protection Study suggest that people with diabetes should aim for a total cholesterol level of less than or equal to 135 mg/dL, especially if they are over the age of 40.¹⁰ Utah adults with diabetes are more than twice as likely to report having high total cholesterol levels than their counterparts without diabetes (45.9% vs. 20.8%). Even moderately elevated cholesterol levels can be serious for people with diabetes.¹¹

In summary, Utah adults with diabetes are much more likely to exhibit CVD risk factors such as high blood pressure, high cholesterol, overweight or obesity than adults without diabetes. They are also less likely to engage in regular physical activity. No major difference is evident between Utah adults with and without diabetes regarding smoking behavior.

Hospitalizations and Heart-felt Complications

The Office of Health Care Statistics, Utah Department of Health, collects information annually for 45 acute-care hospitals in Utah. A total of nine diagnoses are possible for each discharge record. The first-listed (or primary) diagnosis refers to the diagnosis representing the primary reason for admission to the hospital. A contributing diagnosis (diagnoses two through nine) refers to any secondary diagnosis or condition that may also be present but is not the primary reason for the hospital admission.

The 2003 CVD hospital discharge rates for discharges with and without diabetes are shown in Table 2. In this table, a

cardiovascular discharge is a discharge for which the primary diagnosis is some cardiovascular event. Discharges “with diabetes” are those discharges for which diabetes is listed on each record as a contributing diagnosis. Numbers and rates of hospitalizations for CVD events are shown for Utahns with and without diabetes. The rates are calculated for the number of discharges for CVD per 10,000 people with diabetes and per 10,000 people without diabetes.

Hospitalized Utahns with diabetes are over twice as likely to have cardiovascular disease listed as the first or primary diagnosis than their counterparts without diabetes (271.4 vs. 104.2), making

patients with diabetes-related discharges 2.6 times more likely to have a cardiovascular condition listed as the primary diagnosis than those not listing diabetes, even with age-adjustment. The contrast is even more dramatic when examined by specific type of cardiovascular condition. Most striking, age-adjusted discharge rates for congestive heart failure for diabetes-related diagnoses are nearly four times those for non-diabetes-related discharges (51.3 vs. 13.9). Similarly, age-adjusted discharge rates for coronary heart disease among those with diabetes-related discharges are three times those where diabetes is not listed as a contributing diagnosis (111.1 vs. 37.4).

Table 2.

Age-Adjusted Hospital Discharge Rates Listing Any and Specific Cardiovascular Condition as Primary Diagnosis per 10,000 Population for Diabetes-Related Discharges and Non-Diabetes-Related Discharges

Cardiovascular Condition	CVD Primary Diagnosis With Diabetes Also Listed		CVD Primary Diagnosis Without Diabetes Also Listed		Ratio of CVD Rates With Diabetes/ Without Diabetes
	Number of Discharges	Age-Adjusted Rates	Number of Discharges	Age-Adjusted Rates	
Any cardiovascular condition	5,104	271.4	15,148	104.2	2.6
Myocardial infarction	676	37.4	2,219	14.4	2.6
Coronary heart disease	2,083	111.1	5,483	37.4	3.0
Congestive heart failure	1,047	51.3	1,899	13.9	3.7
Stroke	756	37.6	2,541	18.0	2.1

Age-adjusted rates for diabetes discharges are per 10,000 Utahns with diabetes (UHSS 2001 percentages applied to the 2003 population). Age-adjusted rates for non-diabetes discharges are per 10,000 Utahns without diabetes (UHSS 2001 percentages with diabetes deducted from the 2003 population in each age group).

Source: 2003 Utah In-Patient Hospital Discharge Database, Office of Health Care Statistics, Utah Department of Health

Cardiovascular Disease (CVD) - 390-448

Myocardial infarction (MI) - 410

Coronary Heart Disease (CHD) - 402,410-414,429.2

Congestive Heart Failure(CHF) - 428.0, 428.1,428.9

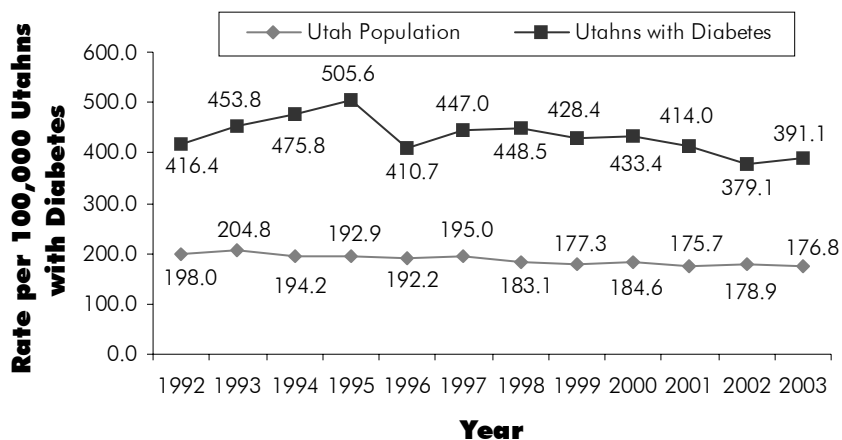
Cerebrovascular Disease (Stroke) - 430-438

The Heartbreak of Cardiovascular Disease Mortality

Over the past decade, between 250 and 300 Utahns with diabetes died each year from cardiovascular complications (See note below).^{*} Trends in CVD death rates among Utahns with diabetes and all Utahns from 1992 to 2003 are contrasted in Figure 1. CVD death rates for the general population have declined gradually since 1992, from 198.0 to 176.8 per 100,000 population, a drop of 10.6 percent. The CVD death rate for diabetes-related deaths has been consistently higher, although a drop of 6.0 percent was seen between 1992 and 2003 (416.4 to 391.1 per 100,000 population with diabetes).

Figure 1.

Contrasting Death Rates for CVD as Underlying Cause for Utahns with Diabetes and all Utahns
Utah Vital Records 1992-2003



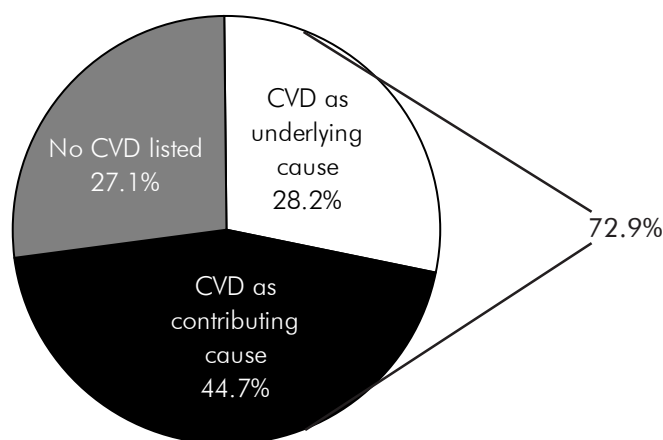
Note: The population with diabetes was obtained from the Utah Health Status Survey, 1996-2003. Cardiovascular deaths for people with diabetes are defined as deaths listing cardiovascular disease as the underlying cause and diabetes as any mentioned cause. Cardiovascular deaths for the general population are the rates of CVD deaths as underlying cause in Utah, regardless of diabetes status. Rates shown are crude rates.

Source: Utah Office of Vital Records and Statistics, Utah Department of Health 2003

72.9% of death certificates with diabetes listed also have CVD listed as underlying or contributing cause.

Figure 2.

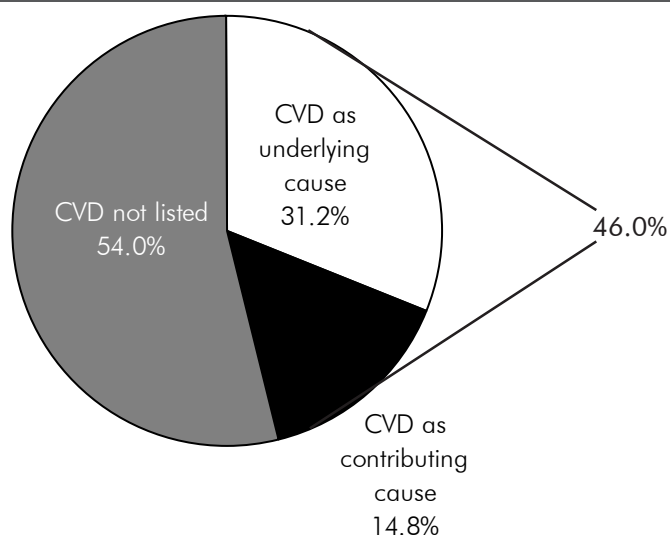
Distribution of Diabetes-Related Deaths by CVD Status
Utah Vital Records 2003



Source: Utah Office of Vital Records and Statistics, Utah Department of Health 2003

Figure 3.

Distribution of Deaths Without Diabetes by CVD Status
Utah Vital Records 2003



Source: Utah Office of Vital Records and Statistics, Utah Department of Health 2003

46.0% of death certificates without diabetes listed have CVD listed as underlying or contributing cause.

Cardiovascular disease is the leading cause of death in the U.S. and in Utah. Figure 2 illustrates the CVD mortality experience for Utah decedents in 2003 with diabetes. In Utah, nearly three-fourths of all diabetes-related deaths listed CVD either as the

underlying cause or contributing cause of death. Just over one-fourth (27.1%) of diabetes-related deaths did not list CVD as either underlying or contributing cause. This pattern mirrors that for the U.S. Nationally, among people with

type 2 diabetes, CVD accounts for almost 70 percent of deaths.¹² In contrast, less than half (46.0%) of deaths without diabetes listed as any cause have CVD as an underlying or contributing cause (Figure 3).

Implications

Adults with type 2 diabetes have the same risk for a coronary event as persons without diabetes who have already had such an event.¹³ Prevention and treatment of the CVD risk factors are, therefore, especially

important for people with diabetes. Cardiovascular disease and diabetes share many of the same risk factors, including high blood pressure, elevated cholesterol levels, sedentary lifestyles, tobacco use, and

overweight and obesity. Reduction in the prevalence of CVD risk factors among people with diabetes may help to reduce the excess risk hospitalization and premature mortality.

For more information, contact the Utah Diabetes Prevention and Control Program, **801-538-6141** or visit the website: **www.health.utah.gov/diabetes**

Resources

Utah Heart Disease and Stroke Prevention Program Utah Department of Health http://health.utah.gov/	Utah Diabetes Prevention and Control Program Utah Department of Health http://health.utah.gov/diabetes	National Diabetes Education Program (NDEP) campaign “ABCs” of diabetes care: A 1c level, Blood pressure, and Cholesterol level
Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) NHLBI Health Information Center P.O. Box 30105 Bethesda, MD 20824-0105 Phone: 301-592-8573 TTY: 240-629-3255 Fax: 301-592-8563 Web site: http://www.nhlbi.nih.gov	National Heart, Lung, and Blood Institute National High Blood Pressure Education Program: Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) EXPRESS Slide Set http://hp2010.nhlbi.nih.net/nhbpep_slds/jnc/jnc7txt.htm	Risk Assessment Tool for Estimating Your 10-year Risk of Having a Heart Attack National Cholesterol Education Program: Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III). http://hin.nhlbi.nih.gov/atpiii/calculator.asp?usertype=pub
American Heart Association American Diabetes Association, Inc. <i>Standards of Medical Care in Diabetes Diabetes Care</i> 27:S15-S35, 2004 http://www.heartcenteronline.com/index2.cfm	Clinical Commentary Reducing Cardiovascular Disease Risk in Patients with Type 2 Diabetes: A Message from the National Diabetes Education Program http://www.aafp.org/afp/20031015/1569.html	Division of Diabetes Translation, Centers for Disease Control and Prevention Cardiovascular Disease Conditions Among Adults with Diabetes Aged 35 Years and Older http://www.cdc.gov/diabetes/statistics/cvd/index.htm
Diabetes and Cardiovascular Disease Toolkit http://www.diabetes.org/for-health-professionals-and-scientists/CVD.jsp		

References

- Duckworth, W. C., McCarren, M., & Abraira, C. (2001). Glucose Control and Cardiovascular Complications: The VA Diabetes Trial. *Diabetes Care*, 24, 942-945.
- Health & Human Services (2003, February 19). American Diabetes Association Renew Campaign to Help People With Diabetes Know Their Cardiovascular Risks. Press Release. Retrieved February 25, 2003, from NIDDK Press Office database.
- Utah Diabetes Prevention and Control Program (2002). *Utahns With Diabetes Survey* [Data file]. Salt Lake City, UT: Bureau of Health Promotion, Utah Department of Health.
- Gavin, J. R., III., Peterson, K., & Warren Boulton, E. (2003). Reducing Cardiovascular Disease Risk in Patients with Type 2 Diabetes: A Message from the National Diabetes Education Program. *American Family Physician*, 68, 1569-1574, 1577-1578.
- Wingard, D. L., & Barrett Connor, E. (1995). Heart Disease and Diabetes. In *Diabetes in America* (Vols. NIH Publication No. 95-1468, pp. 429-448). Washington DC: U.S. Government Printing Office.
- Diabetes Mellitus Interagency Coordination Committee (2001, August 8). NIDDK Diabetes Prevention Program Planning Meeting Summary. News Briefing. Retrieved July 21, 2004, from <http://www.niddk.nih.gov/federal/dmicc/dppresults.pdf>
- Fletcher, G. F., Balady, G., Blarin, S. N., Blumenthal, H., Caspersen, D., Chatimann, B., et al. (1996). Benefits and Recommendation for Physical Activity Programs for all Americans: A Statement for Health Professionals by the Committee on Exercise and Cardia Rehabilitation of the Council of Clinical Cardiology, American Heart Association. *Circulation*, 94, 857-862.
- Kawachi, I., Colditz, G., Stampfer, M., Manson, J., Rosner, B., Hunter, D. J., et al. (1993). Smoking Cessation in Relation to Total Mortality Rates in Women. *Annals of Internal Medicine*, 119, 992-1000 (See also American Diabetes Association (2005). *Standards of Medical Care in Diabetes* (Position Statement). *Diabetes Care*, 27 (Suppl 1), S17.
- Pyorala, K., Pedersen, T. R., Kjeksus, J., Faergeman, O., Olsson, A. G., & Thorgeirsson, G. (1997). Cholesterol Lowering with Simvastatin Improves Prognosis of Diabetic Patients With Coronary Heart Disease: A Subgroup Analysis of the Scandinavian Simvastatin Study (4S). *Diabetes Care*, 20, 614-620.
- American Diabetes Association (2005). *Standards of Medical Care in Diabetes* (Position Statement). *Diabetes Care*, 28 (Suppl 1), S16.
- National Cholesterol Education Program (n.d.). Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III. Position Statement. Retrieved October 25, 2004, from <http://hin.nhlbi.nih.gov/atpiii/calculator.asp?usertype=pub>
- U.S. Department of Health and Human Services (1999). *Diabetes Surveillance Report*. Retrieved March 27, 2002, from <http://www.cdc.gov/diabetes>
- Haffner, S. M., Lehto, S., Ronnema, T., Pyorala, K., & Laakso, M. (1998, July). Mortality from Coronary Heart Disease in Subjects with Type 2 Diabetes and in Nondiabetic Subjects With and Without Prior Myocardial Infarction. *New England Journal of Medicine*, 339, 229-234.

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